

## A COMPREHENSIVE REVIEW ON *GLOBBA MARANTINA* LINN.: AN EXTRA-PHARMACOPOEIAL MEDICINAL PLANT WITH EMERGING THERAPEUTIC POTENTIAL

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### ABSTRACT

**Background:** Medicinal plants continue to play a vital role in global healthcare, particularly in developing countries where traditional medicine forms the backbone of primary health systems. Extra-pharmacopoeial drugs, though not documented in classical Ayurvedic texts, represent an important reservoir of therapeutic agents. *Globba marantina* Linn., a member of the Zingiberaceae family, is one such plant widely used in indigenous medicine for the management of inflammatory, respiratory, and dermatological disorders, yet remains scientifically underexplored. **Methods:** The present review was conducted through a comprehensive analysis of available literature from ethnobotanical surveys, pharmacognostical studies, phytochemical investigations, and preliminary pharmacological reports. Relevant data were systematically compiled and critically evaluated to assess the therapeutic potential and research gaps associated with *Globba marantina*. **Results:** Ethnobotanical evidence indicates the extensive use of

*Globba marantina* in conditions such as rheumatoid arthritis, asthma, and skin disorders. Pharmacognostical studies have established key diagnostic features essential for identification and standardization. Phytochemical investigations reveal the presence of bioactive compounds including flavonoids, phenolics, terpenoids, alkaloids, and glycosides. Preliminary pharmacological studies demonstrate significant antioxidant and antimicrobial activities, supporting its traditional uses. However, the majority of findings are limited to *in-vitro* studies, with a lack of *in-vivo* and clinical validation. **Conclusion:** *Globba marantina* exhibits promising therapeutic potential as an extra-pharmacopoeial medicinal plant. Nevertheless, the absence of comprehensive pharmacological, toxicological, and clinical studies limits its application in evidence-based medicine. Future research focusing on advanced phytochemical characterization, *in-vivo* validation, standardization, and clinical evaluation is essential to establish its efficacy, safety, and therapeutic relevance.

**KEYWORDS:** *Globba marantina*, Extra-pharmacopoeial drug, Ethnobotany, Pharmacognosy, Phytochemistry, Antioxidant activity, Anti-microbial activity, Medicinal plants, Zingiberaceae, Rheumatoid arthritis.

## INTRODUCTION

Medicinal plants continue to serve as a cornerstone of global healthcare systems, particularly in developing nations where traditional medicine plays a significant role in primary health management. The World Health Organization has reported that approximately 80% of the population in developing countries depends on plant-based medicines for their healthcare needs, thereby emphasizing the importance of scientific validation of traditional medicinal knowledge.<sup>[1]</sup>

In the Ayurvedic system, although a vast number of medicinal plants are described in classical texts, several therapeutically valuable plants remain undocumented and are categorized as extra-pharmacopoeial drugs or *Anukta Dravya*. These plants, identified primarily through ethnobotanical knowledge, represent a valuable yet underexplored resource for drug discovery and pharmacological research.<sup>[2]</sup>

Ethnobotanical studies have demonstrated that indigenous and tribal communities possess extensive knowledge regarding the therapeutic use of medicinal plants. This knowledge, often transmitted through generations, serves as an important basis for identifying biologically active compounds and developing modern drugs.<sup>[3]</sup>

*Globba marantina* Linn., belonging to the family Zingiberaceae, is one such extra-pharmacopoeial medicinal plant that has gained attention due to its widespread traditional use in various regions of India, particularly Odisha and the Eastern Himalayan belt.<sup>[4]</sup> The plant grows abundantly in moist and shaded forest ecosystems, making it readily accessible to local populations.<sup>[5]</sup>

Despite its traditional importance, *Globba marantina* has not been included in official pharmacopoeias, and scientific investigations on this plant remain limited and fragmented. This necessitates a comprehensive review to consolidate existing knowledge and identify research gaps.<sup>[6]</sup>

## MATERIAL AND METHODS

### Ethnobotanical Significance

Ethnobotanical surveys conducted in different parts of India have reported the extensive use of *Globba marantina* in the management of inflammatory disorders, particularly rheumatoid arthritis and joint pain. The rhizome is commonly used in the form of paste or decoction, applied externally or administered orally to alleviate pain and inflammation.<sup>[7]</sup>

The repeated use of this plant in musculoskeletal disorders across diverse geographical regions suggests a strong empirical basis for its therapeutic efficacy, as plants consistently used for specific conditions are more likely to exhibit pharmacological activity.<sup>[8]</sup>

In addition to its anti-inflammatory applications, *Globba marantina* is also widely used in the treatment of respiratory disorders such as asthma, cough, and cold. Traditional healers attribute expectorant and bronchodilatory properties to the plant, which may contribute to its effectiveness in respiratory ailments.<sup>[9]</sup>

Ethnomedicinal reports further highlight its use in dermatological conditions including skin infections, wounds, and depigmentation disorders, where topical application of plant extracts is practiced. These uses suggest the presence of antimicrobial and wound-healing properties.<sup>[10]</sup>

The plant has also been traditionally used in the treatment of eye and ear disorders, indicating its application in sensory organ-related conditions and reflecting its broad therapeutic spectrum.<sup>[11]</sup>

Moreover, certain tribal communities incorporate *Globba marantina* into their diet, indicating its safety and potential nutraceutical value. This dual use as both food and medicine reinforces its significance in traditional healthcare systems.<sup>[12]</sup>

### Pharmacognosy and Morphological Characterization

Pharmacognostical evaluation plays a crucial role in the identification and standardization of medicinal plants, especially in the case of extra-pharmacopoeial drugs. *Globba marantina* is a rhizomatous herb characterized by slender stems, simple lanceolate leaves, and distinctive yellow inflorescences typical of the Zingiberaceae family.<sup>[13]</sup>

Microscopic analysis has revealed important diagnostic features such as abundant starch grains, lignified fibers, prismatic calcium oxalate crystals, and well-developed vascular bundles, which are essential for authentication of the crude drug.<sup>[14]</sup>

These anatomical characteristics are particularly useful in differentiating *Globba marantina* from closely related species, thereby preventing adulteration and ensuring quality control in herbal formulations.<sup>[15]</sup>

Physicochemical parameters such as ash values, extractive values, and moisture content further aid in standardization. Studies have reported higher water-soluble extractive values, indicating the predominance of polar constituents.<sup>[16]</sup>

However, the absence of official pharmacopoeial standards highlights the need for further research to establish comprehensive quality control parameters for this plant.<sup>[17]</sup>



Fig.1



Fig.2

### Phytochemical Profile

Phytochemical investigations of *Globba marantina* have demonstrated the presence of diverse secondary metabolites including flavonoids, alkaloids, glycosides, steroids, and phenolic compounds, which are known to contribute to its therapeutic potential.<sup>[18]</sup>

Among these, flavonoids and phenolic compounds play a significant role due to their antioxidant properties, which help in neutralizing free radicals and protecting against oxidative stress-induced damage.<sup>[19]</sup>

Quantitative studies have shown that the plant possesses high total phenolic and flavonoid content, which correlates with its strong antioxidant activity observed in various *in vitro* assays.<sup>[20]</sup>

Essential oil analysis of *Globba* species has identified terpenoid compounds such as  $\beta$ -caryophyllene,  $\alpha$ -humulene, and nerolidol, which are associated with anti-inflammatory and antimicrobial activities.<sup>[21]</sup>

The presence of multiple phytoconstituents suggests possible synergistic interactions, where different compounds work together to enhance the overall therapeutic effect of the plant.<sup>[22]</sup>

### Pharmacological Activities

Preliminary pharmacological studies indicate that *Globba marantina* exhibits significant antioxidant activity, which plays a crucial role in reducing oxidative stress associated with chronic diseases.<sup>[23]</sup>

The antioxidant potential is largely attributed to phenolic and flavonoid compounds, which are known to inhibit lipid peroxidation and neutralize reactive oxygen species.<sup>[24]</sup>

Studies on endophytic microorganisms associated with *Globba marantina* have revealed notable antimicrobial activity against pathogenic microorganisms, including drug-resistant strains, suggesting its potential as a source of novel antimicrobial agents.<sup>[25]</sup>

The antimicrobial effects are likely mediated by terpenoid compounds that disrupt microbial cell membranes and inhibit essential metabolic processes.<sup>[26]</sup>

Although direct anti-inflammatory studies are limited, the presence of bioactive compounds such as  $\beta$ -caryophyllene suggests potential anti-inflammatory activity through interaction with cannabinoid receptors.<sup>[27]</sup>

Flavonoids present in the plant further contribute by inhibiting key inflammatory enzymes such as cyclooxygenase and lipoxygenase, thereby modulating inflammatory pathways.<sup>[28]</sup>

## DISCUSSION

The present review highlights *Globba marantina* as a promising extra-pharmacopoeial medicinal plant with significant ethnomedicinal relevance and emerging scientific interest. The consistent traditional use of the plant in inflammatory conditions such as rheumatoid arthritis, respiratory disorders, and skin diseases across different geographical regions indicates a strong empirical therapeutic potential that warrants systematic scientific validation.

Ethnobotanical evidence serves as a critical foundation for drug discovery, as plants repeatedly used for specific disease conditions often demonstrate corresponding pharmacological activity. In the case of *Globba marantina*, its frequent use in musculoskeletal and inflammatory disorders suggests the presence of bioactive compounds capable of modulating inflammatory pathways, thereby supporting its potential role as an anti-inflammatory agent.

Pharmacognostical studies have established key diagnostic features of the plant, including characteristic rhizome morphology and distinct microscopic markers such as starch grains and calcium oxalate crystals. These findings are essential for authentication and standardization, particularly for extra-pharmacopoeial drugs where the risk of adulteration and substitution remains high.

Phytochemical investigations reveal the presence of flavonoids, terpenoids, and phenolic compounds, which are well known for their antioxidant and anti-inflammatory properties. The coexistence of multiple phytoconstituents suggests a synergistic mechanism of action, which is a hallmark of herbal medicines and may contribute to enhanced therapeutic efficacy.

Preliminary pharmacological studies, particularly those demonstrating antioxidant and antimicrobial activities, provide initial scientific support for its traditional uses. However,

these studies are largely limited to *in vitro* models, and there is a significant lack of *in vivo* and clinical evidence to confirm its therapeutic potential.

A major limitation identified in the current literature is the absence of comprehensive toxicity studies, pharmacokinetic profiling, and standardized dosage guidelines. These gaps pose significant challenges for the safe and effective clinical application of *Globba marantina* and hinder its acceptance in evidence-based medicine.

## CONCLUSION

*Globba marantina* Linn. represents a valuable extra-pharmacopoeial medicinal plant with considerable ethnomedicinal importance and emerging scientific relevance. The plant is widely used in traditional healthcare systems for the management of inflammatory, respiratory, and dermatological disorders, indicating its broad therapeutic applicability.

Pharmacognostical and phytochemical studies provide preliminary evidence supporting its medicinal properties, particularly its antioxidant and antimicrobial activities. The presence of diverse bioactive compounds such as flavonoids, phenolics, and terpenoids offers a strong scientific basis for its traditional uses.

However, despite these promising findings, the available research remains insufficient for its acceptance in evidence-based medicine. The lack of comprehensive pharmacological, toxicological, and clinical studies limits its translational potential. Therefore, systematic scientific validation is essential to establish its efficacy, safety, and therapeutic value.

In conclusion, *Globba marantina* holds significant promise as a medicinal plant, but further research is required to fully explore and harness its therapeutic potential.

## Future Scope

Future research on *Globba marantina* should focus on detailed phytochemical investigations aimed at isolating and characterizing individual bioactive compounds using advanced analytical techniques such as LC–MS, GC–MS, and NMR. Identification of specific lead molecules will facilitate a better understanding of its pharmacological mechanisms and support rational drug development.

Comprehensive *in-vivo* pharmacological studies are essential to validate its traditional uses, particularly in inflammatory conditions such as rheumatoid arthritis. These studies should be

complemented by well-designed clinical trials to establish its efficacy and safety in human subjects, which is a critical requirement for translating ethnomedicinal claims into evidence-based practice.

Toxicological evaluation, including acute, sub-acute, and chronic toxicity studies, is crucial to ensure safe therapeutic application of herbal drugs. Additionally, pharmacokinetic studies are needed to understand the absorption, distribution, metabolism, and excretion of its active constituents, thereby enabling dose optimization and minimizing adverse effects.

Standardization of the plant material through the development of physicochemical parameters, chromatographic fingerprints, and identification of marker compounds is necessary for ensuring quality control and reproducibility. Such standardization strategies are essential for the inclusion of extra-pharmacopoeial drugs into official pharmacopoeias and regulatory frameworks.

Exploration of endophytic microorganisms associated with *Globba marantina* may provide new insights into its antimicrobial potential and contribute to the discovery of novel bioactive compounds. Additionally, comparative phytochemical and pharmacological studies with other members of the Zingiberaceae family may help in understanding its unique therapeutic properties.

Finally, an integrative research approach combining traditional Ayurvedic knowledge with modern scientific methodologies can provide a holistic understanding of the plant. Such interdisciplinary strategies are increasingly recognized as effective approaches for validating traditional medicines and facilitating their incorporation into mainstream healthcare systems.

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